Notebook, N-94-10-08

This notebook covers the periods October 1894-August 1895 and February 1897-September 1898. It was used by Joseph W. Harris and Jonas W. Aylsworth, probably at New Jersey and Pennsylvania Concentrating Works in Ogden, N.J. The book contains notes regarding various ore milling operations, including the electrolytic separation of iron ore, the bricking of ore concentrate, oil and lubrication experiments, and the roller feed at the plant. There are also routine ore assays and notes relating to sand volume experiments. The front cover is labeled "Record of work done in Assay Room" and "General Work." The pages are unnumbered. Approximately 160 pages have been used.

The material relating to sand volume experiments and ore assays has not been filmed.

Nov 8th 1894

Chemical Experiment, dissolving metallic iron of electrolyzer.

Saturated solution of Na Cl for electrolyte.

Piece of wrought iron, polished weighing 17.7 grams, immersed so that an area of 2.11 square inches was acted upon, connected to + pole of dynamo, (oxygen pole) treated with a current of 5 amperes for 2 minutes, lost 180 milli grams. This equals 18 mg. per amp. per minutes, or in this expt, 8.533 mg per amp. per minute, per sq. in.

(see next Page –

Electrolyte exptl. with sol. Na Cl,
[illegible] 17.650 grams,
[illegible] at 9.00 P.M., Nov. 9th –
current [illegible]

Expt. aborted

Piece cast iron weighing
179.540 grams placed in
[illegible] solution of Na Cl
current 0.8 amps. passed
for 11 hours –
started at 9.30 P.M., Nov. 9th
stopped at 8.30 A.M. Nov 10th.

~~Loss of weight~~
Plate weight 172.130 grams
= a loss of 7.410 grams,
11 X 60 = 660 minutes
660
0.6
396 ampere minutes, 396)7.410 18.71 milli-grams.

The cast iron lost 18.71 milli-grams per ampere minute, in Na Cl, against 18 milli-grams per ampere minute with wrought iron. This may be due to local action, or to a more reliable test, owing to a longer time being allowed.

Nov. 10th

Cast iron electrode weighing 172.130 grams immersed in a saturated solution of ferrous sulphate, ($FeSO_4$) at 11.25 A.M., current 0.4 amps. for about 30 minutes then 0.2 amp. for balance of time – stopped at 3.25 P.M. Nov. 10th
= 15.4 mg. per ampere minute

Nov. 12 - 1898

Experiment with piece of cast iron
having an immersed surface of
1/4" square = 1/16 of a square inch
current density 25 amp. per sq.
inch. current 0.5 amp. 2 minutes.

Weight before	4.070 grams
Weight after	4.040 "
loss	0.030 "

= 6.55 mg. per amp. per minute,
nearly the reciprocal of capillarity.

The figures given for which capillarity was partly avoided by covering iron electrode with gravy leaving only 1/4 square exposed =

4.030
4.010
0.020 grams loss

Current 0.5 amp. =
4.44 mg. per ampere minute.
This result is probably most accurate.

of any yet obtained.

Nov. 12th –

Experiment on working of old grease

Some grease boiled with HCl separated oil collected & weighed.

10 grams burnt lime slaked in about 20 grams hot water, water was barely enough to combine with lime,

19½ grams unwashed oil were added, stirred with bamboo & heated on steam mixture was then transferred to water & united some time with pestle. It was quite slippery, but did not seem to have any body, owing to the presence of mechanically mixed water, after heating over burner for some time, to expel water, it was considerably improved.

In making the grease, the water must be expelled, & the mixture must be worked on ground, or it will not always be satisfactory.

Mr. 22nd 1894

Experiment with distilled mug from mould which of brass, to determine the amount of iron salts electrolyzed in a solution of Fe SO4

Current used 8.55 d. m

2 amps, [illegible] – 1/2 [illegible]

surface = 100 ⁿ

current soon fell to below 1/2 15 amps + it did not raise — note 130 at terminals of bath –

liquid soon [illegible] [illegible] very hot, mug became covered with a coating of anhydrous ferrous sulphate which was cut off by a knife with different current stopped after 1 hour & 10 m before the end of the mug was [illegible]

652.2 grams, after the expt, weighed 648.4 grams, that shows a loss of 3.8 grams.

The current probably averaged 15 amps, the average measured was not accurate, on account of the fluctuating of the alternating current.

Before passing current, the ring calipered 3 1/8" full, after the operation stopped, it calipered 3 1/8" scant, the diff being about 1/64".

At the rate of 4.4.4 mg. of iron being dissolved per ampere minute and assuming the average current to have been 14.5 amps, and the time of action to be 1 hour (the action was irregular, owing to failing to) the results obtained correlate the theoretical results,

actual loss, 3.8 grams

loss per ampere-minute 0.00444

60

.26640

average current, amps 14.5

theoretical results, grams 3.86 28 0.0

actual loss grams 3.8

Nov. 23 - 1894

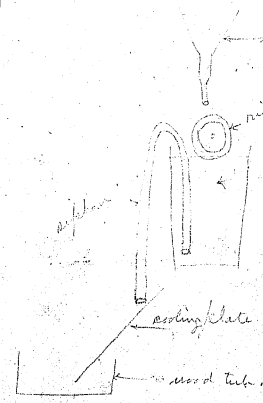
Experimental distillation in Fe Sol.

Our apparatus at 25 cents, has
a capacity of 20 cu. in. surface
[illegible] 14 x 2 sq

It was so arranged that a [illegible]
[illegible] was kept running into
[illegible]

[illegible] and the [illegible] of the
[illegible] [illegible] was
[illegible] running over the [illegible]
so as to keep the ring over
the circulating liquid at [illegible]
the temperature [illegible] so that
one could place the hand on it.
The liquid was removed from jar
by means of a siphon, that fell
[illegible], on account of the liquid

Seing full & hydrogen bubbles.



A number of experiments were made with different current densities to determine the most economical current density.

Electrodes about 1½" apart.

4 cgs. in surface

[illegible] immersed.

Amps	Volts
3.3	5
5	9
10	10
11.5	16
12.0	16

Electrodes ½" apart

4 cgs. in surface immersed

Amps	Volts	Watts consumption per sq. cm. of surface
3.2	3.5	
5.5	6.5	1.46 watts
10	10.5	2.36
13.0	12.0	2.70

Experiments with Nitrate & chloride of iron.

1 cg. in of surface, immersed in experiments.

Nitrate of iron

Amps	Volts
3	6
6	14½
12	20
21½	32

Chloride of iron

Amps	Volts
3	10
6	18
11	27
19	36

(over)

To a [illegible] solution of [illegible] [illegible] 125 c.c. of water of [illegible] 11.564 [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

Amps	Volts	Volts expressed per unit of area, each volt = 0.45 watt
2	2	
6½	6	1.35 watts
12	9.5	2.13 "
26	15	3.37
38	20	4.5

In the above experiment the iron block weighing grams iron, its weight in the [illegible] being 633.5 grams.

Expt. on filling brake tube with sand.

tube holds 27.6 grams 14-20 mesh sand.

tube allowed to fall through 2.5 inches on an iron block to settle the sand, allowed to fall 50 times, then refilled, dropped 50 times more, tied, and [illegible] a total number of 200 drops had been given to it.

Filling different mesh sand, more stuff was put in than with all 14 mesh.

200 mesh stuff, with impalpable dust removed was used along with 110-130 mesh + 14-20 mesh

24 grams 14 mesh
6 " 110-130 "
6 3/4 " 250 mesh

36.75 grams
27.6 "
9.15 " increase

27.6 / 9.15 c.c.
33.1 % increase

Expt with sand –

C.C. measure filled to 10 c.c. mark with 14 mesh sand, & shaken down, water was then added from a measure to fill up the spaces, it required 4 1/2 cc H_2O = 45 % of volume of sand.

C.C. measure filled to 10 c.c. mark with the 24 grams of 16 mesh, 6 grams 110-130 – 6.75 grams 250 mesh, added space filled with H_2O, it required 3 cc H_2O to fill it, = .30 % of volume of sand –
Duplicate expt made with nearly same results.

Experiment with iron ring,

immersed to a depth of about 4 ozf in, in sulphate of copper, having a felt used rubbing against the ring, as ring rotates; so that any ppt. cu. would be rubbed off.

Kept rotating for 1 hour,

before expt, 633·5 grams
after expt, 633·75 "

0,25 " lost.

The solution consisted of 1 lb copper sulphate to 1 gallon water,

Copper did not deposit very well, probably owing to the chemical combination of iron with carbon in the ring

Expt with iron

Weight 632.7 grams

Immersed in solution of ferrous sulphate containing free H_2SO_4 & about 5-10% sulphate of ammonia

Current used 4.25, started stopped at 5.25

Weight before expt, 623.2 grams

= 9.5 grams loss

A surface of 4 sq. in was acted on.

Amps.	Volts
18	11.5
19	14 1/4

The iron results is not liquid but when cold it was 23.5 — 20.5

a little NH_4Cl added at start of expt. gave much better results

17 amps. 8.5 volts.

4 sq. in surface immersed

Shepheards expt with $FeSO_4$ containing NH_4Cl.

Started at 8.50 P.M.

Stopped at 9.50 P.M.

Average Current about 7.5 amps.

Weight after expt, 614.7 grams

8.5 = weight lost

Amps	Volts
13	10
9	6.5
5.5	5
4.5	4

Feb 11th 1895

Assay of old Grease for Calcium

5 grams used.

Contains 1.2 % Ca.

400 lbs grease contains 4.8 lbs Ca

Hcl of 1.123 Sp.G. contains 24.85 %
Hcl gas = 24 %, Cl gas

4.8 lbs Ca requires 8.52 lbs Cl gas
to make 13.32 lbs $CaCl_2$

400 lbs grease requires 36.18 lbs
Hcl of 1.123 sp.g.

400 lbs old grease will require 6.72 lbs
anhydrous Ca O = 1.68 %

Experiment with old grease

20 grams heated + treated with 2 grams
Hcl of 1.123 sp.g, boiled, water filled
filtered reaction neutral.
= equiv of 1.0 % Hcl

20 grams old grease heated + treated with 2.25 grams HCl of 1.123 sp.g. reaction of watery fluid, acid.
Oil was dirty, but dirt seemed to separate on boiling the oil, excess of 25% HCl

20 grams old grease heated + treated with 2.5 grams HCl of 1.123 sp.g. reaction of watery fluid acid. Oil still dirty, but cleared up on boiling excess of 39% HCl

Expt on recovery of old grease.

2 lbs old grease taken off bearings in French engine room and digested with 3.6 ozs HCl of 1.123 sp.g. until lime had been dissolved + a perfectly fluid oil obtained. Oil was very dirty, the watery solution was acid. Oil was separated, filtered through muslin, again heated with same acid solution, separated, filtered through paper filter + used as stock for subsequent experiments. Oil had a brownish cherry red color by transmitted light + slight fluorescence.

1.9 grams anhydrous lime were

slaked in hot water and floated over, as it contained some sand, 100 milligrams more CaO were added (5%)

4 ozs separated oil were combined with the lime mixed well in a mortar, heated to drive off surplus water which was combined with the lime. It was a little darker in color than new grease, but in all other respects seemed to resemble it,

a sample was digested with water & tested with phenolphthalein for acid, but it was found to be neutral.

The % of anhydrous lime mixed with the oil is 1.68, + 5% for sand, makes it 1.75% by weight

In separating the sand in the lime a large excess of water must be used which can then be filtered off.

Experiments on the recovery of
55 grease, furnished by the
Krupp. Mfg. Co, New York.
Grease is a pure Hydrocarbon,
Old grease taken from journal of
Intermediate Roller.

#1

Dissolve in about 6 thousandth weight
of gasoline, filter, distill, grease
is left in retort in a pure
state.

2

Boil with an equal weight of
1.1154 sp g H_2SO_4, until a consider-
able quantity of yellow greasy
foam accumulates on surface,
separate from H_2SO_4. grease
still contains the dirt, but it is no

in the same state it was in before.

Grease is then boiled with a 1.04 Sp.G. solution of Na_2CO_3 (Soda) to neutralize any acid remaining in the grease.

Grease still contains the dirt, lime, separated from the Na_2CO_3 solution, washed with water, separated, boiled to remove water. During this boiling, all the dirt settles to the bottom of the dish and will not recombine with the grease even with violent stirrings. Can be filtered off perfectly clean, or can be decanted after settling.

Grease recovered with H_2SO_4 easily

flackens on heating.

#3

Boil with an equal weight of HCl of sp.g. 1.02 being a 15% sol. by volume, until a yellow foam accumulates on the surface in considerable quantities, separate from acid solution, boil with 1/2 its weight of Na_2CO_3 sol of sp.g. 1.04, to neutralize any free acid separate, wash, separate, boil to remove mechanically enclosed water, when all dirt will separate can then be filtered, has a pure color does not char on heating, except like fresh grease.

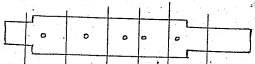
Experiment with oils, determining quantity that flows through a small hole.

A mixture of 1 part crucher Oil 2 parts Fuel oil (from Bayone Oil works) has a Sp.g. of 0.88.

It is necessary to mix about 1½ times its weight (weight of mixed oils) of 200 mesh so 90 oz, with it, in order to give it the same consistancy as crucher oil.

5/32"		3/16"		5/32				
1 hour	403 grams	1 hour	546 grams					Crucher Oil
20 sec.	28 c.c	20 sec	41 c.c.					Machinery Oil
30 sec	128 c.c.	20 sec	220 c.c.	20 sec	272 c.c.			Fuel Oil
20 sec.	115 c.c.	20 sec.	144 c.c.					Lima Oil

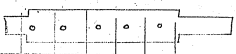
Tests of flow of Grease through holes in #2 Cleveland pin, forced by a grease cup.



	Temp	Length in inches					
#1 Grease	60°	4"	1/4"	0	0	0	Is a lime soap.
Old Std. Oil	110°	3"	1/2"	1/16	1/16	1/32	Will not hold
Gr. Grease	125°	2"	1/2"	1/16	1/16	1/32	its shape above
Melts at 180°	140°	4"	3/8"	3/8"	1/16	1/32	140° F.
		Kruppe Mfg. Co. Grease					
Grease #26	60°	3/8"	11/8"	1/8"	1/8"	1/8	Is a fine lye
Kruppe Mfg. Co.	60°	2"	5/8"	1/8"	1/4"	1/8	ancorium
Melts at 95°	80°	1"	7/8"	3/4"	5/8"	1/2	Will not hold its
							shape at 80°.
Grease #40	75°	Is very hard to turn					Is a soap.
Melts at	80°	4"	1/8	1/8	1/16	1/16	Will not hold
176°	92°	3"	1/4	1/4	1/4	1/8	its shape
	140	1"	1"	1	1	3/4	above 140°
Grease #45	45°	4"	7/8	3/8	1/16	0	Is a mixture
Melts at	65°	2 1/4"	5/8	3/16	1/16	0	of 55 grease &
130°	72	1 1/2"	3/8	1/4	1/16	0	a soap.
	80	1 1/4"	1	3/8	3/8	1/16	Will not hold its
	90	1 1/2	3/4	3/8	1/4	1/16	shape above 90°.
							Turns stiff
							at 45°.

	Temp	Length in inches					
Grease #46	58	1/2	3/8	1/4	3/32	1/16	Appears to be all
Melts at 110°	70	3/4	1/2	3/8	1/4	1/8	hydrocarbons
	78	1	7/8	1/2	3/8	1/4	Will not hold its
							shape at 78°
Grease #55	57	1 1/2	1/2	3/8	3/8	1/8	Is a pure Hydro-
Melts at	70	5/8	3/8	1/4	1/4	1/8	carbon.
96° F	76	3/8	1/4	3/32	3/32	1/16	Will just hold its
	84	1/2	3/8	1/4	1/4	1/8	shape at 84°
Grease #58	65	1"	1"	1"	3/4	5/8	Will not hold its
Melts at 90°	72	1"	1"	1"	1"	1"	shape at 72°
							Appears to be a
							pure Hydrocarbon
							easily blackened
							by heat.
Grease #59	65	1	7/8	3/4	5/8	1/2	Is a pure Hydrocar-
Melts at 85°	76	1/2	3/8	3/8	1/4	1/4	Will just hold its
							shape at 76°
Grease #60	60°	2"	1/8"	0	0	0	Is a hydro-
Melts at 80°	66°	1"	3/4"	1/2	1/4	1/8	carbon mixture
	70°	1"	1"	1"	1"	3/4	Will not hold
							its shape above
							66°

	Temp	Length	Inches in inches				
Grease #61	48	1 1/2	1/2	1 1/4	1/4	1/32	appears to be
Melts at 110°	65	3	1"	1/4	1/4	1/8	pure Hydrocar-
	70	1/2	1/2"	3/8	3/8	1/8	Will not hold
	80	1/2	1/2	1/2	1/2	1/2	its shape at 80°
Grease #63	65°	1"	1/2"	1/4	1/4	1/8	looks like a mixture
Melts at 115°	75°	1/2	3/8	1/4	1/4	1/4	of soap & a soap
							Will not hold its
							shape at 75°
Grease #64	60°	1 1/2	3/16	0	0	0	Resembles #55+
Melts at 102°	70°	2	3/4	1/8	1/16	0	a soap.
	82	1	3/4	1/8	1/8	1/16	Will not hold its
	88	1 1/4	1	1/4	1/8	1/16	shape at 88°
Grease #66	75°	Difficult to turn					
Melts at 105°	90	2 1/4	3/4	3/16	1/16	1/32	Is a soap
	105	1 1/4	3/4	3/8	1/4	1/8	
	116	1 1/2	3/4	3/8	1/4		Will just hold its
	120	3	2	3/4	3/4	5/8	shape at 120°
Grease #70	45	3"	0	0	0	0	Contains a substance
Melts at 126°	55	2"	0	0	0	0	resembling a soap
	76	1 1/2	1/8	0	0	0	Will not hold
	85	1 1/2	5/8	1/4	1/8	0	its shape at 95°
	95	1	1/2	1/4	1/8	1/16	



	Temp.	Length of grease in inches.					
Brass + 75							
Melts at 115°	65	1 1/4	3/16	1/32	0	0	In a stiff +
	70	1 1/4	3/8	1/16	1/32	0	grease compound.
	80	3/4	3/8	1/8	1/16	1/32	Will not hold
	90	3/4	3/8	3/16	1/8	1/16	its shape above 90°

June 7th

Experiments made to determine the volume of "pores" in a baked brick.

Brick contained about 40% larger than standard 50 mesh ore, had 20 cts. much mixed with it was very hard + fairly satisfactory.

	grams
Weight of brick before immersion	298.5
" " " after "	313.2
Weight of gasoline absorbed	14.7
	cc
Vol. of gasoline before immersing brick	125
Vol. of gasoline after immersing brick, and brick had absorbed all it would,	220.5
Vol. of gasoline after removal of soaked brick	98 cc
Vol of gasoline absorbed by brick, by diff	27 cc
Total cubic vol. of brick including pores,	122.5 cc
volume of pores in brick,	27 cc
volume of solid matter,	95 cc

(over)

Volume of piers in brick 22 2 0

Volume [illegible] walls in brick 78 2 0

June 19th 1895

Experiments with iron soaps, &c.

Iron soap lubricants

Iron soap formed of 5 cts per lb.

1 lb. soap	100 lbs water,	cut	5 cts	per 100 lbs	
2 " "	100 "	"	"	10 "	" " "
3 " "	100 "	"	"	15 "	" " "
4 " "	100 "	"	"	20 "	" " "
5 " "	100 "	"	"	25 "	" " "
6 " "	100 "	"	"	30 "	" " "
7 " "	100 "	"	"	35 "	" " "
8 " "	100 "	"	"	40 "	" " "

After standing one hour, in room at a temp. of 85°F, # 1-2-3 are still fluid, the remainder are stiff.

These mixtures are to be used as lubricants for the elevators.

(are not satisfactory)

July 8th 1895

Experiments with dirty grease.

Tried dissolving 25 parts of dirty grease in 75 parts of fuel oil, heating, filtering through muslin and evaporating the filtrate to distil off the oil & thus recover the grease. It is necessary to refilter the oil as many as five (5) times before a sufficient sediment has collected to clean the oil and grease from the dirt. On heating the oil & grease mixture to drive off the oil, the grease decomposes & carbonizes and after nearly all the oil has been driven off it becomes sticky on cooling.

The same results were had with crude lime oil and oil from oil tank.

On treatment with gasoline and filtering through paper, and evaporating the grease can be recovered, but the gasoline is difficult to remove entirely, and towards the last, the grease decomposes.

A mixture of 25 parts grease and 75 parts of oil (fuel, lime, or tank oil) can be used in elevators in place of mixture of 1 part crude oil and two parts fuel oil used at present.

July 23 - 1895

Tested with current on magnet 12 amp.
Test of Roller feed on 8" magnet -
Iron roller, 1" diameter.

The consisted of about 97 % rag ore, (through coarse 50-mesh screen) & 3 % of 14-mesh ore. There was a number of large pieces among the coarse ore.

Slot above roller feed was ½" wide
Roller feed turned by hand, turns counted & timed.
at the rate of

24 revs.	per minute,	gives 1125	lbs per foot per hour
30 "	"	" 1305	" " "
36 "	"	" 1485	" " "
42 "	"	" 1665	" " "
60 "	"	" 2115	" " "
90 "	"	" 2925	" " "

The 3/8" holes 1 3/16" between centers, used at present give 1413 lbs per foot per hour.
The roller feed should make 33 2/3 revs. per minute to give the same amount (by calculation)

Muck in Muck house

Aug 9th 1895

Rosin 100

Lima Petroleum 45

Rosin 700 lbs -

Oil 320 lbs -

Rosin melted first, then Oil run in.

This proportion was used on account of hot weather

In winter it will be necessary to use more oil (See Water in Bucking Concentrates, special note book)

Aug 10th 1895

Standard mush consists of Rosin 100
Petroleum 50

It may be necessary in very cold weather to raise it to
Rosin 100
Petroleum 57½
because in cold weather Standard mush gives too many "balls".

The following is a scale of lbs of standard mush at different prices.

10 cts worth	=	22.5	lbs	per ton
11 " "	=	24.75	"	" "
12 " "	=	27.00	"	" "
13 " "	=	29.25	"	" "
14 " "	=	31.50	"	" "
15 " "	=	33.75	"	" "
16 " "	=	36.00	"	" "
17 " "	=	38.25	"	" "
18 " "	=	40.50	"	" "
19 " "	=	42.75	"	" "
20 " "	=	45.00	"	" "

The mixers are to receive 400 lbs concentrates per minute and mush lift sprocket to run at 1⅔ revs. per minute to give 45 lbs shot mush per ton, = 20 cts. = 8 lbs mush per 400 lbs ore

Bricks are to be baked at a temperature between 475°F to 500°F, for one hour, if baked at a lower temperature, they may soften again on heating, if baked at a higher temperature, they may oxidize, + become brittle after cooling.

Bricks should not absorb more than 1.5% water in 24 hours, if standard mark is used.

assay of 50 meals sent for
[illegible]
Alumina ✓ little.
Potash ✓
Soda -

fuel oil cake all right, if it is a little warm.

This mixture was tested in bearings, but was found to be too thin. It should be say twice as thick.

Eureka made with 10 parts soap to 180 parts water, is thick on cooling, is satisfactory

Made bucket full of alum, 1-18, using 1 lb soap : 18 lbs water

October 8th 1894

Experiments made with a solution of drying soap in water, to be used as a lubricator

Several solutions made, and one consisting of 10 parts soap, 350 parts water, gives good results.

The soap costs 7 cts per 8 oz. cake.

It has no effect on rusty iron, expt. tried by boiling the soap water containing rusty iron, for 3 days, the water was then oxidized with nitric acid, filtered, & ammonia added, no iron ppt. came down, nor did the solution become tinted due to traces of iron.

In making, do not boil solution longer than necessary, or the soap appears to separate in finely divided particles, which do not seem to be slippery.

This solution passes through a sight-110 mesh stuff to settle to the depth of 1 inch, through 8" of solution, some 40 mesh stuff settled in 1/2 minute.

Experiment made with

18 1/2 grams Rosin

25 cc sld sol. Na_2O = 2 1/2 grams Na_2O

and 95 cc H_2O.

The 25 cc Na_2O was diluted to 100 cc first, rosin added, then water, then more rosin.

Experiment was made on steam bath.

There was a residue of 0.9 grams of rosin which did not combine.

The solution measured 90 cc, 30 cc of water was unused, a few drops of resinate added, then mixed with the 90 cc + warmed together, + poured in beaker to cool slowly.

After cooling, a pt. of Rosin came down

Solution was placed in a tall graduate, it took 6 minutes for some thorough shaking, descended fairly slow.

A very finely divided pt of Rosin came down, which partly helped to assimilate the rest.

Expt with Resinate of Soda —

Na_2O	2.5 grams
Rosin	22.0
H_2O	80

Cost 15 cts —

There was a residue of 3 grams of rosin which did not seem to combine with the soda —

This was then diluted with 1/2 its volume of water, making it cost 10 cts per 100 lbs —

The addition of cold water ppts. Rosin which is partly dissolved on warming.

The 15% of Rosin which separated should be left out in the first place, + the additional water added which weighing the stuff.

On mixing with ore in a tall glass the particles of ore agglomerated + on

Expt with Resinate of soda as follows

Na_2O	2.5 grams
Rosin	22½ "
H_2O	80

The Rosin did not all combine, about 10% remained in dish, when fluid was poured off, + ore added & shaken up, the ore seemed to "ball" up + deposit in lumps. It deposited very slow, owing to the viscosity of the solution. On diluting with water, the Rosin separated.

Cost 15 cts per 100 lbs —

The agglomerating of the particles of iron may have been due to particles of free rosin cementing them together

Experiment made with a solution of Resinate of soda, made as follows,

2.5 grams Na_2O (Roland Soda) dissolved in 25 cc H_2O
75 cc H_2O added.

22.5 grams powdered Rosin added.
a small quantity did not combine with the soda solution.

This mixture was put in a tall glass cylinder, & mixed with ore, to see how rapidly the ore settled.
The solution was not viscous enough.
Cost 12.6 cts. per 100 lbs.